



Fixed-Mounted Circuit-Breaker Switchgear Type NXPLUS C up to 24 kV, **Gas-Insulated** (New Panel Version 2000 A, 2500 A)

Medium-Voltage Switchgear

Supplement February 2008 to Catalog HA 35.41

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The products and systems described in this catalog are manufactured and sold according to a certified quality and environmental management system (acc. to ISO 9001 and ISO 14001). (DQS Certificate Reg. No. DQS 003473 QM UM). The certificate is accepted in all IQNet countries.

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Application

Types



Circuit-breaker panel (example)

Fixed-mounted circuit-breaker switchgear NXPLUS C is a factory-assembled, type-tested, metal-enclosed, metal-clad, SF₆-insulated switchgear for single-busbar and double-busbar applications for indoor installation.

Application

Typical uses, ratings

Fixed-mounted circuit-breaker switchgear NXPLUS C is used in transformer and switching substations, e.g., in:

- Power supply companies
- Power stations
- Cement industry
- Automobile industry
- Iron and steel works
- Rolling mills
- Mining industry
- Textile, paper and food industries
- Chemical industry
- Petroleum industry
- Pipeline installations
- Offshore installations
- Electrochemical plants
- Petrochemical plants
- Shipbuilding industry
- Diesel power plants
- Emergency power supply installations
- Lignite open-cast mines
- Traction power supply systems

Electrical data (maximum values) and dimensions

Rated voltage	kV	7.2	12	15	17.5	24
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Rated short-duration power-frequency withstand voltage	kV	20	28 ¹⁾	36	38	50
Rated lightning impulse withstand voltage	kV	60	75 ¹⁾	95	95	125
Rated peak withstand current	kA	80	80	80	63	63
Rated short-circuit making current	kA	80	80	80	63	63
Rated short-time withstand current 3 s	kA	31.5	31.5	31.5	25	25
Rated short-circuit breaking current	kA	31.5	31.5	31.5	25	25
Rated normal current of busbar	A	2500	2500	2500	2500	2500
Rated normal current of feeders	A	2500	2500	2500	2000	2000
Width	mm	600 ²⁾	600 ²⁾	600 ²⁾	600 ²⁾	600 ²⁾
Depth – without pressure relief duct at the rear	mm	1100	1100	1100	1100	1100
– with pressure relief duct at the rear	mm	1225	1225	1225	1225	1225
Height	mm	2250	2250	2250	2250	2250

1) 42 kV/75 kV according to some national requirements

2) 900 mm for rated normal feeder currents of 2000 A and 2500 A

Requirements

Features

Environmental independence

Hermetically tight, welded switchgear vessels made of stainless steel make NXPLUS C switchgear

- Insensitive to aggressive ambient conditions, such as
 - Salt water
 - Air humidity
 - Dust
 - Temperature
- Tight to ingress of foreign bodies, such as
 - Dust
 - Pollution
 - Small animals
- Independent of site altitude

Compact design

Thanks to the SF₆ insulation, compact dimensions are possible

Thus,

- Existing switchgear rooms can be used effectively
- New constructions cost little
- Costly city-area space is saved

Maintenance-free design

Switchgear vessels designed as sealed pressure systems, maintenance-free switching devices and enclosed cable plugs ensure

- Maximized power supply reliability
- Personnel safety
- Sealed-for-life design according to IEC 62 271-200 (sealed pressure system)
- Installation, operation, extension and replacement without SF₆ gas work
- Reduced operating costs
- Cost-efficient investment
- No maintenance cycles

Innovations

The use of digital secondary systems and combined protection and control devices ensures

- Clear integration in process control systems
- Flexible and highly simplified adaptation to new system conditions and thus to cost-efficient operation

Requirements

Safety

Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- Cable terminations, busbars and voltage transformers are surrounded by earthed layers
- All high-voltage parts including the cable terminations, busbars and voltage transformers are metal enclosed
- Capacitive voltage detecting system to verify safe isolation from supply
- Operating mechanisms and auxiliary switches safely accessible outside the primary enclosure (switchgear vessel)
- Due to the system design, operation is only possible with closed switchgear enclosure
- Standard degree of protection IP 65 for all high-voltage parts of the primary circuit, IP 3XD for the switchgear enclosure according to IEC 60 529 and VDE 0470-1
- High resistance to internal arcs by logical mechanical interlocks and tested switchgear enclosure
- Panels tested for resistance to internal faults up to 31.5 kA
- Logical mechanical interlocks prevent maloperation
- Make-proof earthing by means of the vacuum circuit-breaker

Security of operation

- Hermetically sealed primary enclosure independent of environmental effects (pollution, humidity and small animals)
- Maintenance-free in an indoor environment (IEC 62 271-1 and VDE 0671-1)
- Operating mechanisms of switching devices accessible outside the primary enclosure (switchgear vessel)
- Metal-coated, plug-in inductive voltage transformers mounted outside the SF₆ switchgear vessel
- Current transformers as ring-core current transformers mounted outside the SF₆ switchgear vessel
- Complete logical mechanical interlocking system
- Welded switchgear vessels, sealed for life
- Minimum fire load
- Type and routine-tested
- Standardized, NC production processes
- Quality assurance in accordance with DIN EN ISO 9001
- More than 500,000 switchgear panels of Siemens in operation worldwide for many years
- Option: Aseismic design

Reliability

- Type and routine-tested
- Standardized, NC production processes
- Quality assurance in accordance with DIN EN ISO 9001
- More than 500,000 switchgear panels of Siemens in operation worldwide for many years

Technology

General

- Three-pole enclosure of the primary part consisting of a switchgear vessel made of stainless steel
- Insulating gas SF₆
- Three-position switch as busbar disconnecter and feeder earthing switch
- Make-proof earthing by means of the vacuum circuit-breaker
- Compact dimensions due to SF₆ insulation
- Hermetically tight, welded switchgear vessel made of stainless steel
- Single-pole, solid-insulated, screened busbars, plug-in type
- Cable connection with outside-cone plug-in system, or for connection of solid-insulated bars
- Wall-standing or free-standing arrangement
- Cable connection access from front
- Option: Cable connection access from rear (only circuit-breaker panel 1250 A)
- Installation and extension of existing switchgear on both sides without gas work and without modification of existing panels

Interlocks

- According to IEC 62 271-200 and VDE 0671-200
- Logical mechanical interlocks prevent maloperation
- Three-position disconnecter can only be operated with circuit-breaker in OPEN position
- Circuit-breaker or contactor can only be operated with three-position switch in end position and operating lever removed
- Switch-disconnector, contactor, ring-main and metering panels are not interlocked due to their own switching capacity
- Three-position disconnecter interlocked against the circuit-breaker in circuit-breaker panels and in bus sectionalizers with one panel width
- Locking device for feeder

- Locking device for three-position switch
- Cable compartment cover (access to HV HRC fuses) always interlocked against the three-position switch-disconnector in panels with HV HRC fuses (switch-disconnector panel, metering panel and contactor panel with fuses)
- Option: Cable compartment cover interlocked against the three-position switch (circuit-breaker panel, disconnecter panel, contactor panel without fuses, ring-main panel)
- Option: Electromagnetic interlocks
- Option: Actuating openings can be locked with padlocks
- Option: Locking device for "feeder earthed"

Modular design

- Panel replacement possible without SF₆ gas work
- Low-voltage compartment can be removed, plug-in bus wires

Transformers

- Current transformers not subjected to dielectric stress
- Easy replacement of ring-core current transformers
- Metal-coated, plug-in and disconnectable voltage transformers

Vacuum circuit-breaker

- Maintenance-free under normal ambient conditions according to IEC 62 271-1 and VDE 0671-1
- No relubrication or readjustment
- Up to 10,000 operating cycles
- Vacuum-tight for life

Secondary systems

- Numerical protection, measuring and control equipment
- Option: Customary multi-function protection relay with integrated protection, control, communication, operating and monitoring functions
- Can be integrated in process control systems

Technical Data

Electrical data, filling pressure, temperature for single-busbar switchgear

Common electrical data, filling pressure and temperature	Rated insulation level	Rated voltage U_r	kV	7.2	12	15	17.5	24
		Rated short-duration power-freq. withstand voltage U_d :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	20	28 ¹⁾	36	38	50
		– across the isolating distance	kV	23	32 ¹⁾	39	45	60
		Rated lightning impulse withstand voltage U_p :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	60	75 ¹⁾	95	95	125
		– across the isolating distance	kV	70	85 ¹⁾	110	110	145
	Rated frequency f_r	50/60 Hz						
	Rated normal current I_r ²⁾ for the busbar	up to A	2500	2500	2500	2500	2500	2500
	Rated filling level p_{re} ³⁾	150 kPa (absolute) at 20 °C						
	Minimum functional level p_{me} ³⁾	130 kPa (absolute) at 20 °C						
	Ambient air temperature	– 5 °C to +55 °C						

Panel data

Circuit-breaker panel and bus sectionalizer 2000 A 2500 A	Rated normal current I_r ²⁾	A	2000	2000	2000	2000	2000	
		A	2500	2500	2500			
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25
		for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25
	Rated peak withstand current I_p		up to kA	80	80	80	63	63
	Rated short-circuit making current I_{ma}		up to kA	80	80	80	63	63
	Rated short-circuit breaking current I_{sc}		up to kA	31.5	31.5	31.5	25	25
Electrical endurance of vacuum circuit-breakers	at rated normal current		10,000 operating cycles					
	at rated short-circuit breaking current		50 breaking operations					
Disconnecter panel 2000 A 2500 A	Rated normal current I_r ²⁾	A	2000	2000	2000	2000	2000	
		A	2500	2500	2500			
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	31.5	31.5	31.5	25	25
		for switchgear with $t_k = 3$ s	up to kA	31.5	31.5	31.5	25	25
	Rated peak withstand current I_p		up to kA	80	80	80	63	63

1) Higher values of the rated short-duration power-frequency withstand voltage available with:
– 42 kV for phase-to-phase, phase-to-earth, open contact gap as well as
– 48 kV across the isolating distance

Higher values of the rated lightning impulse withstand voltage:
– 95 kV for phase-to-phase, phase-to-earth, open contact gap as well as
– 110 kV across the isolating distance

2) The rated normal currents apply to ambient air temperatures of max. 40 °C. The 24-hour mean value is max. 35 °C (acc. to IEC 62 271-1/ VDE 0671-1)

3) Pressure values for SF₆-insulated switchgear vessels

Technical Data

Room planning

Switchgear arrangement

- For single-busbar applications:
 - Wall-standing arrangement or
 - Free-standing arrangement
- Face-to-face arrangement accordingly
- For double-busbar applications:
 - Back-to-back arrangement (free-standing arrangement)

Room dimensions

See opposite dimension drawings

Door dimensions

The door dimensions depend on the dimensions of the individual panels (see page 8 and Catalog HA 35.41-2007, pages 10 to 17)

Switchgear fastening

- For floor openings and fixing points of the switchgear, see page 8 and Catalog HA 35.41-2007, pages 10 to 17
- Foundations:
 - Steel structure
 - Steel-reinforced concrete with foundation rails, welded or bolted on

Panel dimensions

See page 8 and Catalog HA 35.41-2007, pages 10 to 17

Weights

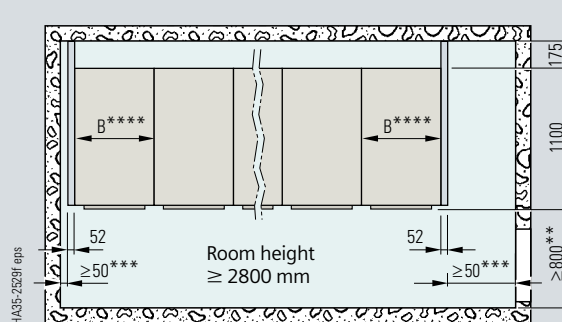
Single-busbar panels

- Panels for ≤ 1250 A: Approx. 800 kg
- Panels for > 1250 A: Approx. 1400 kg

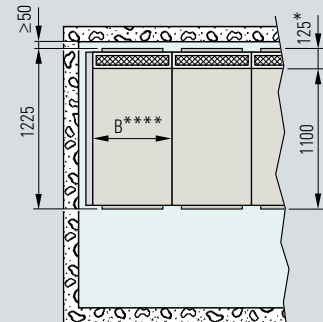
Double-busbar panels

- Panels for ≤ 1250 A: Approx. 1600 kg

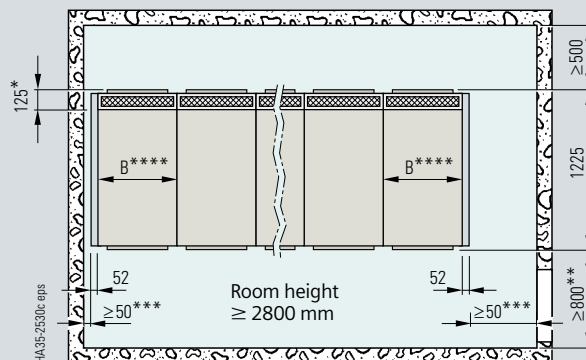
Room planning for single-busbar switchgear



Wall-standing arrangement (top view)
Panels without pressure relief duct



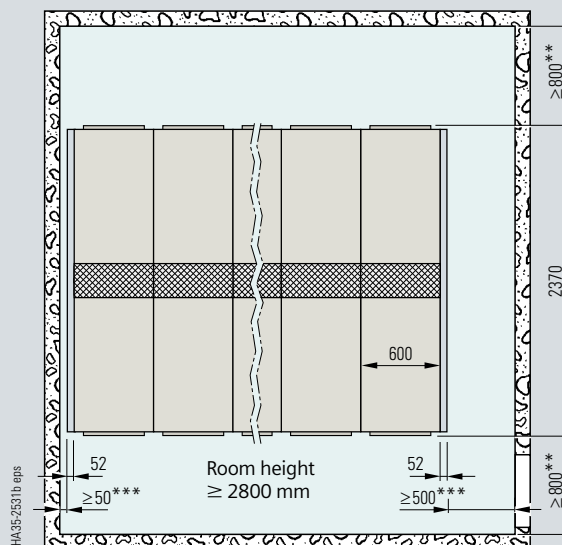
Wall-standing arrangement (same as left side), but panels with pressure relief duct



Free-standing arrangement (top view)
Panels with pressure relief duct

- * 125-mm-deep pressure relief duct at the rear
- ** Depending on national requirements; for extension/panel replacement: Control aisle ≥ 1400 mm recommended
- *** Lateral wall distances: On the left or right ≥ 500 mm recommended
- **** For panel width, see dimensions on page 8 and Catalog HA 35.41-2007, pages 10 to 17

Room planning for double-busbar switchgear



Free-standing arrangement (top view)

- ** For panel replacement: Control aisle ≥ 1400 mm necessary
- *** Lateral wall distance ≥ 50 mm optionally possible on the left or right

Technical Data

Shipping data, classification

Transport

NXPLUS C switchgear is delivered in form of individual panels.

The following must be noted:

- Transport facilities on site
- Transport dimensions and weights
- Size of door openings in building

In case of double-busbar panels the A and B sides are supplied separately.

Packing

Place of destination inside Germany or other European countries

- Means of transport:
Rail and truck
- Type of packing:
– Panels on open pallets
– Open packing with PE protective foil

Place of destination overseas

- Means of transport:
Ship
- Type of packing:
– Panels on open pallets
– In closed crates with sealed upper and lower PE protective foil
– With desiccant bags
– With sealed wooden base
– Max. storage time: 6 months

Transport dimensions, transport weights ¹⁾

Panel width	Transport dimensions Width x Height x Depth	Transport weight with packing	without packing
mm	mm x mm x mm	approx. kg	approx. kg

Single-busbar switchgear

Transport inside Germany or to other European countries

1 x 600	1100 x 2470 x 1450	900	800
1 x 900	1450 x 2470 x 1450	1500	1400
1 x 600 (cable connection top rear)	1100 x 2470 x 2100	900	800

Transport overseas

1 x 600	1130 x 2650 x 1450	900	800
1 x 900	1480 x 2650 x 1450	1500	1400
1 x 600 (cable connection top rear)	1130 x 2650 x 2100	900	800

Double-busbar switchgear

Transport inside Germany or to other European countries

1 x 600	1100 x 2470 x 1450	900	800
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Transport overseas

1 x 600	1130 x 2650 x 1450	900	800
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Classification of the NXPLUS C switchgear according to IEC 62 271-200

Design and construction

Partition class	PM (metallic partition)
Loss of service continuity category ²⁾ Panels	LSC 2A LSC 2B
– with HV HRC fuses	
– without HV HRC fuses	
Accessibility to compartments (enclosure)	Tool-based Non-accessible Tool-based
– Busbar compartment	
– Switching-device compartment	
– Low-voltage compartment	
– Cable compartment	
– without HV HRC fuses	Tool-based
– with HV HRC fuses	Interlock-controlled and tool-based

Internal arc classification

Designation of internal arc classification IAC for	7.2 kV, 12 kV, 15 kV IAC A FL 31.5 kA, 1 s IAC A FLR 31.5 kA, 1 s	17.5 kV, 24 kV IAC A FL 25 kA, 1 s IAC A FLR 25 kA, 1 s
– Wall-standing arrangement		
– Free-standing arrangement		
Type of accessibility A	Switchgear in closed electrical service location, access "for authorized personnel only" (according to IEC 62 271-200)	
– F	Front	
– L	Lateral	
– R	Rear (for free-standing arrangement)	
Arc test current	25 kA, 31.5 kA	
Test duration	1 s	

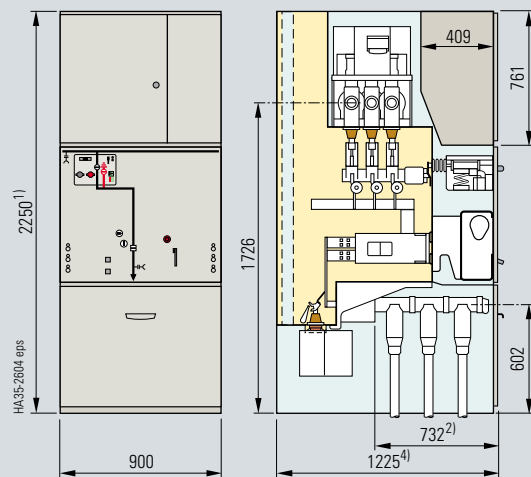
1) Average values depending on the degree to which panels are equipped.

2) The loss of service continuity category is referred to the complete switchgear, i.e. the panel with the lowest category determines the loss of service continuity category of the complete switchgear.

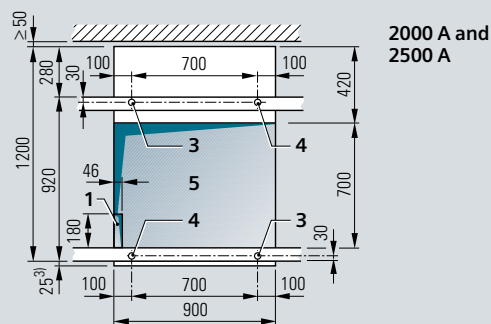
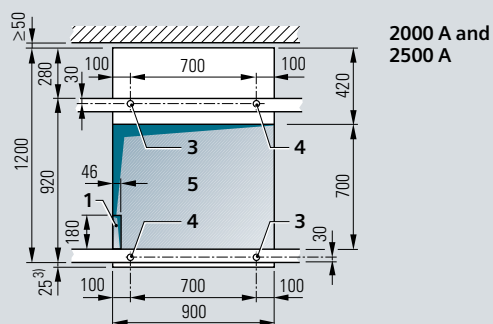
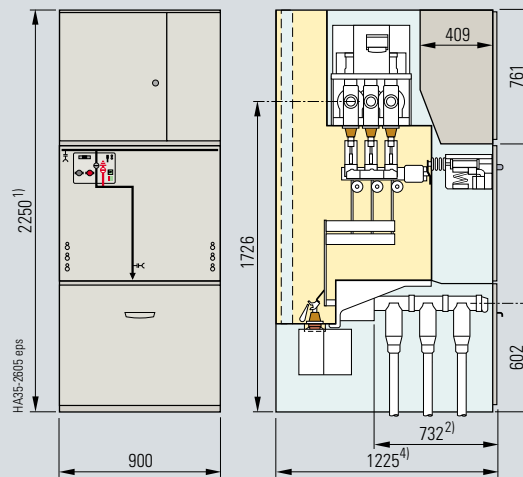
Dimensions

Front views, sections, floor openings, fixing points for single-busbar switchgear

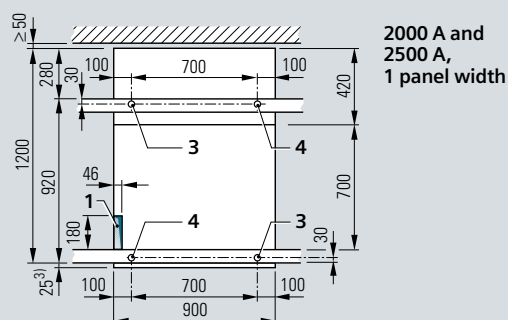
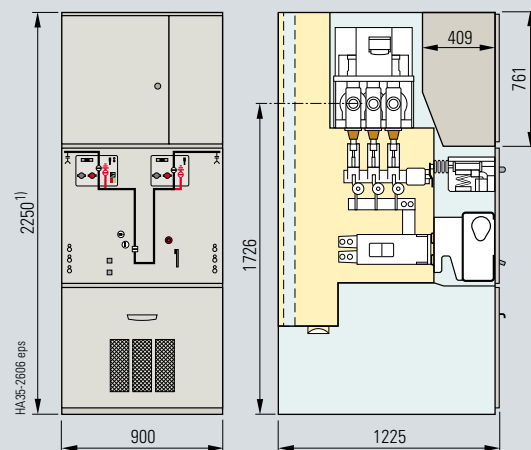
Circuit-breaker panel



Disconnecter panel



Bus sectionalizer with disconnecter



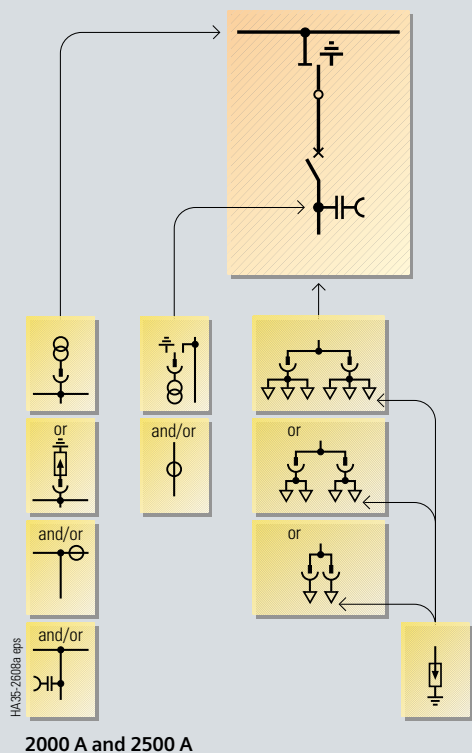
- 1 Floor opening for control cables
- 3 Mounting hole for M8 / M10
- 4 Mounting hole for M8 / M10 (for aseismic version only)
- 5 Floor opening for high-voltage cables

- 1) 2650 mm for higher low-voltage compartment
- 2) 752 mm for deeper cable compartment cover
- 3) 45 mm for deeper cable compartment cover
- 4) 1120 mm for deeper cable compartment cover

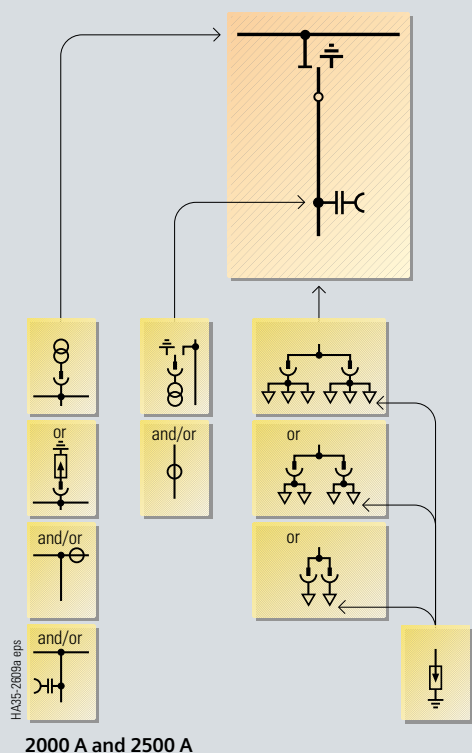
Product Range

Single-busbar panels

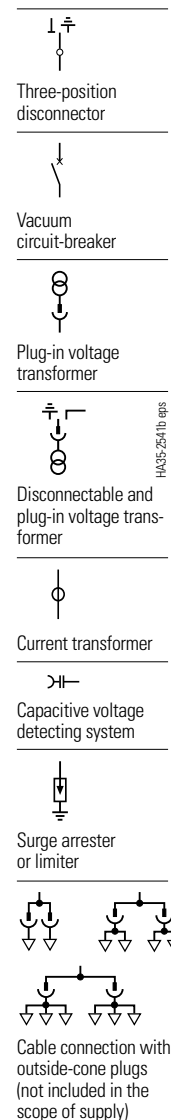
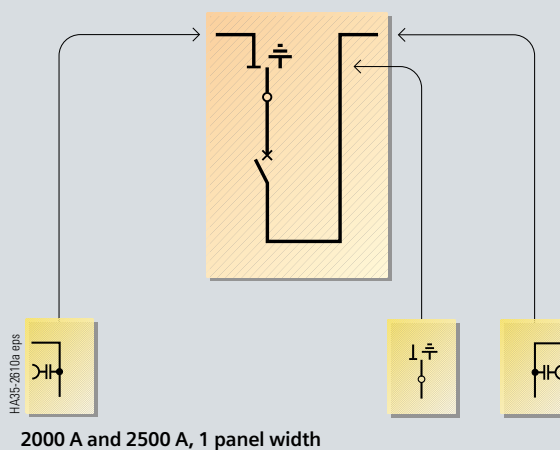
Circuit-breaker panel



Disconnecter panel



Bus sectionalizer



Components

Panel connection

Features

- Bushings with outside cone
- With bolted contact (M16) as interface type "C" according to EN 50 180 / EN 50 181
- Cable connection height in mm:

Height	Panel width in mm
702	600
602	900
450	for all switch-disconnector and contactor panels with HV HRC fuses

- Max. connection depth: 584 mm or 732 mm with standard cable compartment cover, 752 mm with deeper cable compartment cover
- With cable bracket, e.g. type C40 accord. to DIN EN 50 024
- Option: Access to the cable compartment only if the feeder has been isolated and earthed
- For thermoplastic-insulated cables
- For cable T-plugs or cable elbow plugs with bolted contact
- For connection cross-sections up to 630 mm²
- Cable routing downwards, cable connection from the front
- Option: Cable routing to the top at the rear, cable connection from the rear (only for circuit-breaker panel 1250 A)
- For rated normal currents up to 2500 A
- Cable plugs, cable sealing ends and cable clamps are not included in the scope of supply

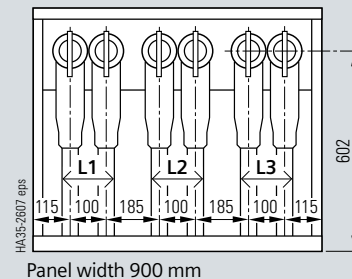
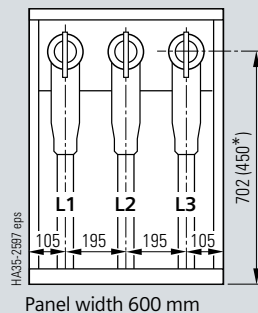
Surge arresters

- Can be plugged into the cable T-plug
- Surge arresters are recommended if, at the same time,
 - The cable system is directly connected to the overhead line,
 - The protective range of the arrester at the terminal tower of the overhead line does not cover the switchgear

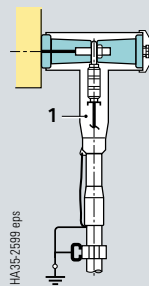
Surge limiters

- Can be plugged into the cable T-plug
- Surge limiters are recommended if motors with starting currents < 600 A are connected

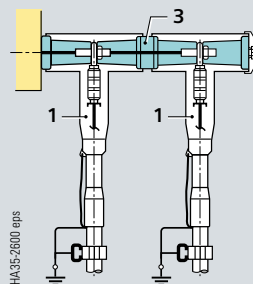
Cable compartment



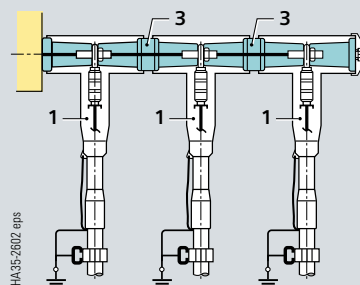
Connectable cables



Connection with 1 cable per phase
connection with 2 cables per phase



Connection with 2 cables per phase
connection with 4 cables per phase



Connection with 3 cables per phase
connection with 6 cables per phase

Legend

- 1 Cable T-plug
- 2 Coupling T-plug
- 3 Screwed coupling insert

* Cable connection height of 450 mm for switch-disconnector panels and contactor panels with HV HRC fuses

Notes

If not stated otherwise on the individual pages of this catalog, we reserve the right to include modifications, especially regarding the stated values, dimensions and weights.

Drawings are not binding

All product designations used are trademarks or product names of Siemens AG or other suppliers.

If not stated otherwise, all dimensions in this catalog are given in mm.

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